SHARP SERVICE MANUAL

CODE : 00ZXEA212VSME

ELECTRONIC CASH REGISTER

MODEL XE-A212

(V version)

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Parts marked with "⚠" are important for maintaining the safety of the set. Be sure to replace these parts with specified ones for maintaining the safety and performance of the set.

SHARP CORPORATION

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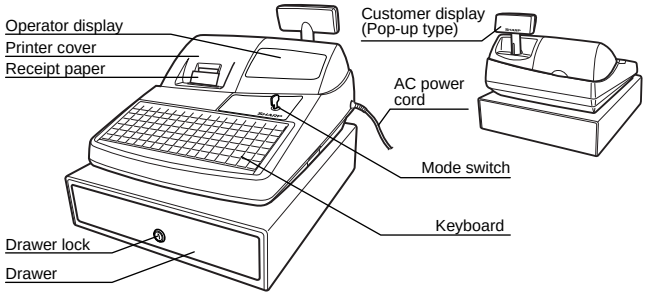
The contents are subject to change without notice.

CHAPTER 1. SPECIFICATIONS

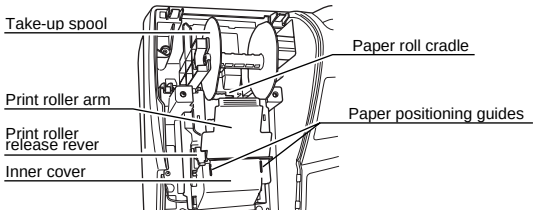
1. APPEARANCE

■**Front view**



■**Rear view**

■**Printer**



2. RATING

	XE-A212
Weight	11.3kg
Dimensions	421 (W) x 429 (D) x 305 (H) mm
Power source	220V~230V (±10%) 50/60Hz 230V~240V (±10%) 50Hz
Power consumption	220V~230V: Stand-by 9W Operating 35W (max) 230V~240V: Stand-by 9.6W Operating 36W (max)
Working temperature	0°C~40°C (32°F to 104°F)

3. KEYBOARD

1) KEYBOARD LAYOUT

Type	Flat
Key position	STD/MAX 119
Key pitch	18 (W) x 15 (H) mm
Key layout	Fixed type

2) KEY LIST

■**Keyboard layout**

↑	ESC	2	4	6	GC RCPT	L3	7	14	21	28	35	42	49	56	63	70
RCPT	EX	1	3	5	AUTO	L2	6	13	20	27	34	41	48	55	62	69
CLK #	VAT	⊗	•	CL	DEPT #	L1	5	12	19	26	33	40	47	54	61	68
#	PLU/SUB	7	8	9	GLU	NBAL	4	11	18	25	32	39	46	53	60	67
⊖	%	4	5	6	CR1	CR2	3	10	17	24	31	38	45	52	59	66
PO	RA	1	2	3	CH1	CH2	2	9	16	23	30	37	44	51	58	65
∞	RF	0	00	NS	ST	TL	1	8	15	22	29	36	43	50	57	64

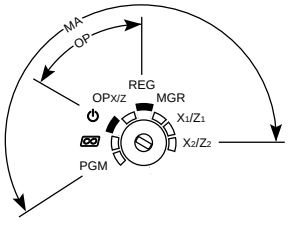
■**Key names**

KEY TOP	DESCRIPTION
↑	Paper feed key
ESC	Escape key
RCPT	Receipt print key
CLK#	Clerk code entry key
#	Non-add code/Time display key
EX	Foreign currency exchange key
VAT	Value added tax key
PLU/SUB	PLU/Subdepartment key
⊖	Discount key
%	Percent keys
PO	Paid-out key
RA	Received-on account key
∞	Void key
RF	Refund key
1 ~ 6	Department keys
⊗	Multiplication key
•	Decimal point key
CL	Clear key
00, 0~9	Numeric keys
NS	No sale key
GC RCPT	Guest check receipt key
AUTO	Automatic sequence key
DEPT #	Department code entry key
L1 ~ L3	PLU leve shift keys
GLU	Guest look up key
NBAL	New balance key
CR1, CR2	Credit 1 and 2 keys
CH1, CH2	Cheque 1 and 2 keys
ST	Subtotal key
TL	Total key
1 ~ 70	Direct PLU keys

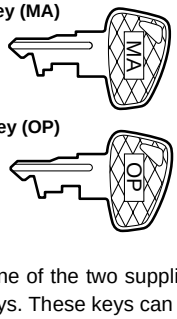
4. MODE SWITCH

1) LAYOUT

• Rotary type



Manager key (MA)



Operator key (OP)

The mode switch can be operated by inserting one of the two supplied mode keys - manager (MA) and operator (OP) keys. These keys can be inserted or removed only in the “REG” or “⏻” position.

The mode switch has these settings:

⏻: This mode locks all register operations. (AC power turns off.) No change occurs to register data.

OP X/Z: To take individual clerk X or Z reports, and to take flash reports.

It can be used to toggle receipt state “ON” and “OFF” by pressing he [RCPT] key.

REG: For entering sales.

PGM: To program various items.

∞: Enters into the void mode. This mode allows correction after finalizing a transaction.

MGR: For manager’s entries. The manager can use this mode for an override entry.

X1/Z1: To take the X/Z report for various daily totals.

X2/Z2: To take the X/Z report for periodic (weekly or monthly) consolidation.

5. DISPLAY

1) OPERATOR DISPLAY

Display device : LCD

Number of line : 2 line

Number of positions : 16 positions

Color of display : Yellow / Green

Character form : 5 x 7 dots

Character size : 8.06mm (H) x 4.84mm (W)

Layout:

2) CUSTOMER DISPLAY

Display device : LED

Number of line : 1 line

Number of positions : 7 positions

Color of display : Yellow / Green

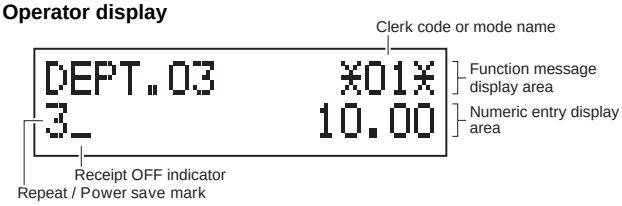
Style : Pop up type

Character form : 7 segment + Dp

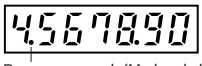
Character size : 14.2mm (H) x 7.9mm (W)

Layout:

Operator display



Customer display (Pop-up type)



Power save mark (Mark only lights up in the power save mode.)

- **Clerk code or Mode name**

  The mode you are in is displayed. When a clerk is assigned, the clerk code is displayed in the REG or OP X/Z mode. For example, "*01*" is displayed when clerk 01 is assigned.

- **Repeat mark**

  The number of repeats is displayed, starting at "2" and incremental with each repeat. When you have registered ten times, the display will show "0". (2→3 .....9→0→1→2...)

- **Power save mark**

  When the cash register goes into the power save mode, the power save mark (decimal point) lights up.

- **Function message display area**

  Item labels of departments and PLU/subdepartments and function texts you use, such as %, (–) and CASH are displayed.
  When an amount is to be entered or entered, "AMOUNT" is displayed: When an amount is to be entered, ------- is displayed at the numeric entry area with "AMOUNT". When a preset price has been set, the price is displayed at the numeric entry area with "AMOUNT".

- **Numeric entry display area**

  Numbers entered using numeric keys are displayed here.

Date and time display

Date and time appear on the display in the OP X/Z, REG, or MGR mode. In the REG or MGR mode, press the [#] key to display the date and time.

Error message

When an error occurs, the corresponding error message is displayed in the function message display area.

■Machine state symbols

P: Appears during programming.

E: Appears when an error is detected.

o: Appears when the subtotal is displayed or when the amount tendered is smaller than the sales amount.

c: Appears when the [EX] key is pressed to calculate a subtotal in foreign currency.

F: Appears when a transaction is finalized by pressing the [TL/NS], [CH1], [CH2], [CR1] or [CR2] key.

C: Appears when the change due amount is displayed.

E-E: Appears in the far-left three positions at the timing of key entry when the electronic journal (EJ) memory is full. (Depending on programming.)

L: Appears when the voltage of the installed batteries is under the required level. You must replace with new ones within two days.

⌞: Appears when the batteries are not installed, or the installed batteries are dead. You must replace with new ones immediately.

•: May appear right below the eighth and ninth places at the timing of finalization of a transaction when the electronic journal (EJ) memory is nearly full.
Also appears right below the tenth place when power save mode is effective.

E-EU: Appears when programmed date (and time) for EURO modification operation is come.

H: Appears when the print roller arm is not locked.

PPPPPPPPPP :Appears when the paper is not set or out.

6. PRINTER

1) Printer

- Part number : M-T53II
- NO. of station : 1 (Receipt or journal)
- Validation : No.
- Printing system : Line thermal
- No. of dot : 288 dots
- Dot pitch : Horizontal 0.167mm
  Vertical 0.174mm
- Font : 10 dots (W) × 24 dots (H)
- Printing capacity : max. 24 characters/Line
- Character size : 1.67mm (W) × 4.17mm (H) at 10 × 24 dots
- Print pitch : Column distance 2.0mm
  Row distance 5.21mm
- Print speed : Approximate 60mm/s (Approximate 12 l/s)
- Paper feed speed : Approximate 60mm/s (Approximate 12 l/s)

(Manual feed) : Approximate 60mm/s (Approximate 12 l/s)

- Reliability : Mechanism LIFE 6 million lines used to high-quality thermal paper
- Paper end sensor : Set up
- Cutter : No
- Near end sensor : No

2) Paper

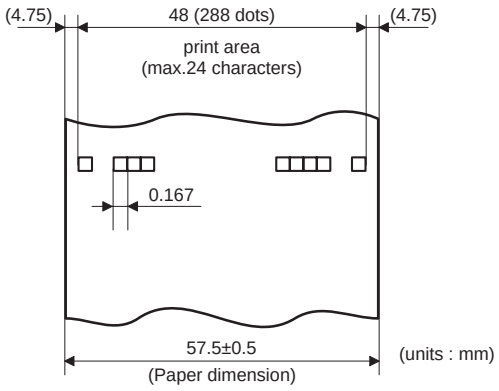
- Paper rolldimension: 57.5 ± 0.5mm in width
  Max. 80mm in diameter
- Paper quality: High-quality thermal paper
  paper thickness: 0.06 to 0.08mm

3) Logo stamp

- No

4) Printing area

Number of thermal head heater elements 288 dots



7. DRAWER

[OUTLINE]

- Standard equipment: Yes (1)
- Max. number of additional drawers: 0
- The drawer consists of:

1) Drawer box (outer case) and drawer
2) Money case
3) Lock (attached to the drawer)

[SPECIFICATION]

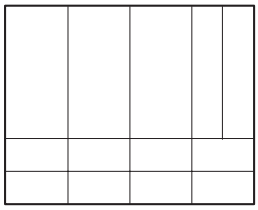
1) DRAWER BOX AND DRAWER

Model name of the drawer box	SJ-420
Size	355 (W) x 424 (D) x 125 (H) mm
Material	Metal
Bell	–
Release lever	Standard equipment: situated at the bottom
Drawer open sensor	Yes

2) MONEY CASE

Separation from the drawer	Allowed
Separation of the bill compartments from the coin compartments	Allowed
Bill separator	–
Number of compartments	5B/8C

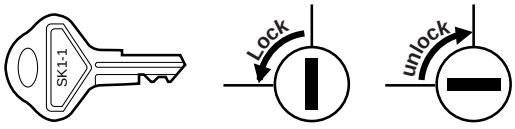
Layout:



5B/8C

3) LOCK (LOCK KEY : LKGIM7331BHZZ)

- Location of the lock: Front
- Method of locking and unlocking:
  To lock, insert the drawer lock key into the lock and turn it 90 degrees counter clockwise.
  To unlock, insert the drawer lock key and turn it 90 degrees clockwise.
- Key No: SK1-1



8. BATTERY

1) MEMORY BACK UP BATTERY

For memory back up, the dry battery AA (3 pieces) are needed.

1. Memory holding time:

   Approx. 1 year after New dry batteries are installed.

2. Battery exchange method:

   When the low battery symbol “L” lights up, replace the batteries (3 AA) by the following method;

   1) Power on the ECR.
   2) Mode switch turn to “REG” mode.
   3) Remove the OLD dry batteries (3 pieces).
   4) Insert the NEW dry batteries (3 pieces).
   5) Confirm the low battery symbol “L” is off.

2) LOW BATTERY

Low battery indication will appear on the left side of display when the battery voltage is low.

CASE 1: When any numeric entry & any item entry is not done or just after finalization.

The machine can indicate the low battery condition. (Always)

CASE 2: When numeric entry or item entry is done.

Battery condition will not appear.
Exceptionally, when the power is restored after a power failure, the low battery condition will appear on the display only when the battery is low.
And the indicator will disappear after any key entry.

[Display sample]

“ 0.00” : Battery is OK.
“L 0.00” : Low battery (You have to change the batteries.)
“L 0.00” : No battery (You have to change the batteries immediately.)

After finalization

“F 12.34” : Battery is OK.
“L 12.34” : Low battery. (“L” indicate instead of “F”.)
“L 12.34” : No battery. (“L” indicate instead of “F”.)

Note: “NO BATTERY”: When the “NO BATTERY” is display, the master reset is executed at the timing of “POWER ON” after the “POWER OFF”.

CHAPTER 2. OPTIONS

1. OPTIONS (No)

2. SERVICE OPTIONS (No)

3. SUPPLIES

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	Roll paper	TPAPR6645RC05	AY	5roll/pack

4. SPECIAL SERVICE TOOLS

NO	NAME	PARTS CODE	PRICE RANK	DESCRIPTION
1	RS-232 Loop-back connector	UKŌG−6705RCZZ	BU	

CHAPTER 3. MASTER RESET AND PROGRAM RESET

1. MASTER RESETTING

Master resetting clears the entire memory and resumes initial values.

Master resetting can be accomplished by using the following procedure:

Procedure A:
1) Plugin the AC cord to the wall outlet.
2) Set the mode switch to REG position.
3) Let the ECR be witout the memory backup battery.
4) Unplug the AC cord from the wall outlet.
5) Wait over 1 minute for discharging.
6) Plugin the AC cord to the wall outlet.

The master reset can also be accomplished in the following case.

In case power failure occurs when the machine has no battery attached to it, the master reset operation is automatically performed after the power has been restored.

(This is because if power failure occurs with no battery attached to the machine, all the memories are lost and the machine does not work properly after power recovery; this requires the master reset operation.)

2. PROGRAM RESETTING (INITIALIZATION)

This resetting resumes the initial program without clearing memory.

This resetting can be operated at below sequence in PGM mode.

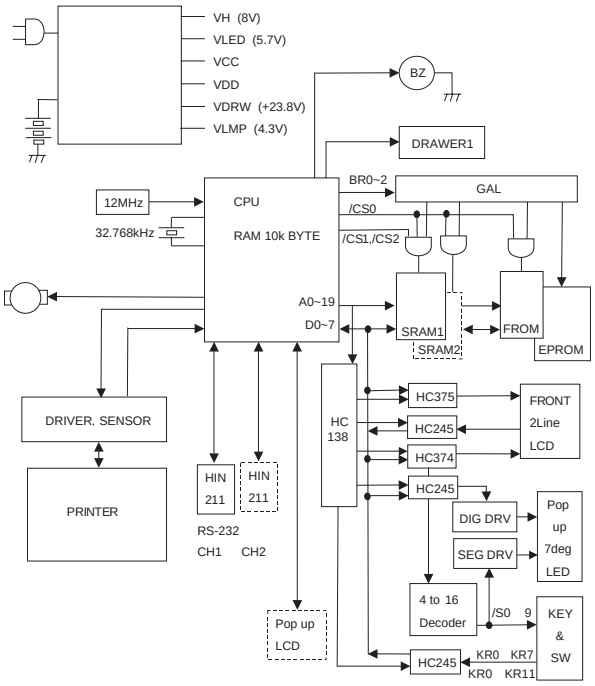
Procedure:
1) Unplug the AC cord from the wall outlet.
2) Wait over 1 muinite for discharging.
3) Set the mode switch to the PGM position.
4) While holding down the FEED key, plugin the AC cord to the wall outlet.

Note: In case power failure occurs when the machine has no battery attached to it, the master reset operation is automatically performed after the power has been restored.

CHAPTER 4. HARDWARE DESCRIPTION

1. BLOCK DIAGRAM

XE-A212V



CPU

MITSUBISHI M30620SAFP
(INTERNAL RAM 10KB)

EXTERNAL MEMORY

SRAM	512KB
FLASH ROM	512KB
	SHARP LH28F004BVT

PRINTER

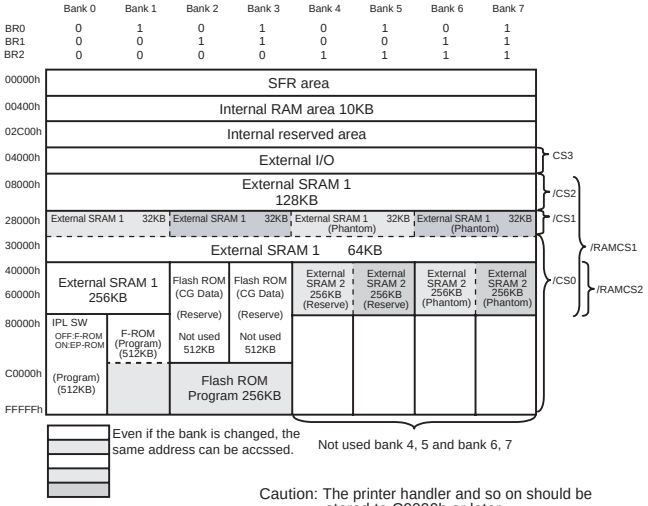
M-T53II

RS-232

1ch

2. MEMORY MAP

2-1. ADDRESS MAP



Caution: The printer handler and so on should be stored to C0000h or later.

2-2. EXTERNAL BUS

External BUS ACCESS SPEED

SRAM/EPROM/FLASH ROM ; 2 BCLK

External I/O ; 2 BCLK ✱1BCLK = 83.3ns (at 12MHz)

SRAM	/CS2 area:	address 08000h ~ 27FFFh 128KB
	/CS1 area BANK 0, 2:	address 28000h ~ 2FFFFh 32KB x 2
	/CS0 area BANK 0:	address 30000h ~ 3FFFFh 64KB address 40000h ~ 7FFFFh 256KB
Reserve	/CS0 area BANK 4, 5:	address 40000h ~ 7FFFFh 256KB x 2
FLASH ROM	/CS0 area BANK 0	address 80000h ~ FFFFFh 256KB (Moves to Bank 1 when rewritten using EPROM)
Reserve	/CS0 area BANK 6:	address 80000h ~ FFFFFh 256KB
I/O	/CS3 area BANK 0:	address 04000h ~ 07FFFh 16KB

3. PRINTER CONTROL

3-1. STEPPING MOTOR CONTROL

The two phase Bi-Polar stepping motor is driven at a constant voltage by SANYO LB1838M.
1step: 0.087mm, 1dot: 2step

< CPU's PORT >

No.	CPU PORT	Signal to be used
76	P14	IN1
75	P15	IN2
74	P16	ENA1
73	P17	ENA2

< Driving steps >

	Driver IC input (CPU output)				Motor driving signal			
STEP	IN1	IN2	ENA1	ENA2	A (OUT1)	B (OUT3)	/A (OUT2)	/B (OUT4)
1	L	L	H	H	H	H	L	L
2	H	L	H	H	L	H	H	L
3	H	H	H	H	L	L	H	H
4	L	H	H	H	H	L	L	H

∗When the motor is at rest, the same phase as the final excitation phase is RUSH energize to turn off all phases. → Turn ENA1 and ENA2 into L.

No energizing should be allowed at lease 40 ms after stopping the motor before restarting.

When starting the motor etc, required the chopping

3-2. HEAD CONTROL

HEAD: 288 dots in all, width: 0.167mm/dot (6dot/mm)

<Related PORT>

No.	I/O	PORT	Function	Signal name	Initial value	Port setup in single chip mode
18	OUT	P84		PRINTING /STB2	H	Out L
89	OUT	P107		PRINTING /STB1	H	Out L
30	OUT	P70	TXD2	PRINTING DAT (Print DATA)	H	Out L
28	OUT	P72	CLK2	PRINTING PCLK (Transfer Clock)		Out L
90	OUT	P106		PRINTING /LAT (DATA Latch)	H	Out L
91	OUT	P105		PRINTING VPON (Head motor POWER SUPPLY)	L	Out L

/STB1: 1 ~ 144 dot: 144 dots in all
/STB2: 145 ~ 288 dot: 144 dots in all
} Total 288 dots

Conduction pulse width: Refer to the M-T53II specifications.

OFF time of print strobe : Conduction strobe OFF time between dots min. 160us

Logo print ratio restriction : Average print ratio 35% or below (Same as the M-T51)
When the print ratio at the peak one-dot line is 50%, the average print ratio of 10-dot line including the above line should be 35% or less.

∗When turning on or off the printer power supply, make sure to turn /STB1, 2 to "H".

∗Do not turn on without paper.

∗THERMAL HEAD power supply control : Turns ON when P105= "H"; turns OFF when "L". (The power supply for HEAD and STEPPING MOTOR is shared). When printing is finished (when the motor is stopped) Athe power should be turned OFF.

∗Before printing or feeding paper, perform A/D conversion in 20 ms after the printer head is turned ON and make sure the voltage is stable.
(The power supply of the printer head should be turned ON and OFF by using the regulator IC.)

∗The head rank confirmation was abolished.

3-3. WINDING MOTOR CONTROL

<Related port>

No.	I/O	PORT	Function	Signal name	Initial value	Port setup in single chip mode
21	Out	P81		Printer motor (Winding motor)	L	ON

3-4. PAPER EMPTY DETECTION

When LOW is detected twice continuously in sampling of signals for every one dot line, it is judged as paper empty.

The threshold level of High/Low level is 2.5 ± 0.2V. (Vcc = 5VDC ± 5%)

When paper empty is detected, printing is terminated. However, when paper empty is detected during printing, 15-dot lines from detection of paper empty can be printed.

3-5. PLATEN OVER

When signals are sampled in the frequency of 1ms or less and open state is detected twice continuously, it is judged as platen over.

If the head is conducted under the platen over state, the thermal head life may be shortened. When, therefore, platen over is detected, printing is terminated.

Under the platen over state (switch open state), driving the paper feed motor is inhibited.

4. CPU

- M16C/64A Group: M30620SAFP
- Processor mode = Microprocessor mode
- Internal reserve area, without expansion
- Multi function 16-bit Timer: Output system 5 lines + input system 6 lines
- Serial I/O:

M16C/64A PORT MEMORY SPACE: NORMAL MODE
PROCESSOR MODE: MICRO PROCESSOR MODE
It is used by (SEPARATE BUS 8bit Width)

PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function	PORT	PIN No.	I/O	Pin name	Signal name	Initial value	OFF MODE	Function
P00	88	I/O	D0	D0		Out L		P54	42	O	/HLDA	(NU)		Out L	
P01	87	I/O	D1	D1		Out L		P55	41	I	/HOLD	/HOLD		In	
P02	86	I/O	D2	D2		Out L		P56	40	O	ALE	(NU)		Out L	
P03	85	I/O	D3	D3		Out L		P57	39	I	/RDY	/RDY		In	
P04	84	I/O	D4	D4		Out L		P60	38	O	/RTS0	/RS2	H	In	RS-232 /RS2
P05	83	I/O	D5	D5		Out L		P61	37	O	CLK0	N.U. (FSCK)	L	Out L	FMC DSCK
P06	82	I/O	D6	D6		Out L		P62	36	I	RXD0	RD2		In	RS-232 RD2
P07	81	I/O	D7	D7		Out L		P63	35	O	TXD0	SD2	L	Out L	RS-232 SD2
P10	80	O	P10	/PLCS	H	Out L	Pop up LCD Chip Select	P64	34	O	/RTS1	/RS1	H	Out L	RS-232 /RS1
P11	79	O	P11	/PLRD	H	Out L	Pop up LCD Read clock	P65	33	I	P65	IPL ON		In	IPL ON Signal
P12	78	O	P12	/PLWR	H	Out L	Pop up LCD Write clock	P66	32	I	RXD1	RD1		In	RS-232 RD1
P13	77	O	P13	PLDATA	L	Out L	Pop up LCD serial DATA	P67	31	O	TXD1	SD1	H	Out L	RS-232 SD1
P14	76	O	P14	IN1	L	Out L	Paper feed motor (IN1)	P70	30	O	TXD2	DAT	L	Out L	PRINTER DATA OUT
P15	75	O	P15	IN2	L	Out L	Paper feed motor (IN2)	P71	29	I	RXD2	N.U. (BUSY)		In	PRINTER DATA IN
P16	74	O	P16	ENA1	L	Out L	Paper feed motor (ENA1)	P72	28	O	CLK2	PCLK	L	Out L	PRINTER CLOCK
P17	73	O	P17	ENA2	L	Out L	Paper feed motor (ENA2)	P73	27	O	P73	DRAWER 1	L	Out L	DRAWER DRIVE SIGNAL
P20	72	O	A0	A0		Out L		P74	26	O	P74	/ER1	H	Out L	RS-232 /ER1
P21	71	O	A1	A1		Out L		P75	25	I	P75	/CD1		In	RS-232 /CD1
P22	70	O	A2	A2		Out L		P76	24	I	P76	/CS1		In	RS-232 /CS1
P23	69	O	A3	A3		Out L		P77	23	I	P77	/DR1		In	RS-232 /DR1
P24	68	O	A4	A4		Out L		P80	22	O	P80	BUZZER	L	Out L	
P25	67	O	A5	A5		Out L		P81	21	O	P81	MOTOR	L	In	Printer winding motor
P26	66	O	A6	A6		Out L		P82	20	I	/INT0	/POFF		In	Power interruption
P27	65	O	A7	A7		Out L		P83	19	O	/INT1	/WP	H	Out L	FROM /WP
P30	63	O	A8	A8		Out L		P84	18	O	P84	/STB2	H	In	PRINTER /STB2
P31	61	O	A9	A9		Out L		P85	17	I	/NMI	(NU)		In	
P32	60	O	A10	A10		Out L		P86	11	O	XCOUT	XCOUT			32.768kHz
P33	59	O	A11	A11		Out L		P87	10	I	XCIN	XCIN			32.768kHz
P34	58	O	A12	A12		Out L		P90	7	I	P90	MDR		In	MODE KEY SENSE
P35	57	O	A13	A13		Out L		P91	6	I	P91	MSENS		In	MISCELLANEOUS SENSE
P36	56	O	A14	A14		Out L		P92	5	O	P92	BR1	L	Out L	BANK signal1
P37	55	O	A15	A15		Out L		P93	4	O	P93	BR0	L	Out L	BANK signal0
P40	54	O	A16	A16		Out L		P94	3	O	P94	/LDCS	H	Out L	LCD DATA LATCH signal
P41	53	O	A17	A17		Out L		P95	2	O	P95	BLON	L	Out L	BACK LIGHT ON
P42	52	O	A18	A18		Out L		P96	1	O	P96	LCDON	L	Out L	LCD POWER ON
P43	51	O	A19	A19		Out L		P97	100	O	P97	BR2	L	Out L	BANK singal2
P44	50	O	/CS0	/CS0		Out H		P100	97	I	AN0	TM		In	HEAD temperature monitor
P45	49	O	/CS1	/CS1		Out H		P101	95	I	AN1	VPTEST		In	HEAD voltage monitor
P46	48	O	/CS2	/CS2		Out H		P102	94	I	AN2	VREF		In	Referance voltage
P47	47	O	/CS3	/CS3		Out L	External I/O Chip Select	P103	93	I	AN3	VBAT		In	VBAT (Battery voltage)
P50	46	O	/WR	/WR		Out L		P104	92	O	AN4	/ER2	H	In	RS-232 /ER2
P51	45	O	/BHE	(NU)		Out L		P105	91	O	P105	VPON	L	Out L	PRINTER HEAD POWER
P52	44	O	/RD	/RD		Out L		P106	90	O	P106	/LAT	H	In	PRINTER DATA LATCH
P53	43	O	BCLK	BCLK		Out L		P107	89	O	P107	/STB1	H	In	PRINTER /STB1

<Power supply/CONTROL pins>

PORT	PIN No.	I/O	Pin name	Function	PORT	PIN No.	I/O	Pin name	Function
BYTE	8	I	BYTE	Connected to VDD	Vcc	62		Vcc	Connected to VDD
CNVss	9	I	CNVss	Connected to VDD	Vss	64		Vss	connected to GND
/RESET	12	I	/RESET		AVss	96		AVss	Connected to GND
Xout	13	O	Xout	OPEN	Vref	98		Vref	Connected to VDD
Vss	14		Vss	Connected to GND	AVcc	99		AVcc	Connected to VDD
Xin	15	I	Xin	connected to Spectram diffusion IC					
Vcc	16		Vcc	Connected to VDD					

5. KEY-DISPLAY

5-1. LCD CONTROL

Basically the same as the XE-A401 and ER-A275P.

<LCD-related registers>

Function	Address	R/W
LCD Write Data	04001h	W
LCD Read Data	04002h	R
LCD Control Signal / Key Strobe Signal	04003h	W
Data Latch Signal	CPU port P94	W

< LCD Control Signal / Key Strobe Signal >

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	–	E	R/W	RS	KS3	KS2	KS1	KS0

Bit7 : Not used

Bit6 : E
Enable Signal ⎍ Enable

Bit5 : R/W
H : Data read L : Data Write

Bit4 : RS
H : Data input L : Instruction Input

< Data Latch Signal >

L : LCD write data latch

5-2. KEY/DISPLAY SCAN

On the machine, the key and display scan signal is common.

KEY/display SCAN and key read should be performed at the following timing.

① KEY/display SCAN cycle: 10ms

② Blanking time: 50us

③ KEY DATA READ timing: More than 10 ms from the fall of the SCAN signal

<Key/Display-related registers>

Function	Address	R/W
LED Segment Signal	04000h	W
LCD Control Signal / Key Strobe Signal	04003h	W
Key Return Signal	04003h	R

< LED Segment Signal > ⋯ Wite

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04000h	dp	g	f	e	d	c	b	a

< LCD Control Signal/Key Strobe Signal > ⋯ Write

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04003h	-	E	R/W	RS	KS3	KS2	KS1	KS0

Bit3 ~ 0 : KS3 ~ 0

Strobe signals for keys and POP UP Display are generated at KS3 - 0.

< Key Return Signal > ⋯ Read

Address	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
04001h	-	-	-	-	KR11	KR10	KR9	KR8
04003h	KR7	KR6	KR5	KR4	KR3	KR2	KR1	KR0

Normal Keyboard : 04003h

Flat Keyboard : 04001h + 04003h

5-3. KEYSCAN MATRIX

PENDING
Others

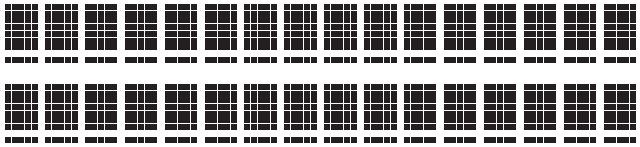
	CPU	STO	ST1	ST2	ST3	ST4	ST5	ST6	ST7	ST8	ST9
MODE	P90	SRV	PGM		Time	REG	MGR	X1/Z1	X2/Z2		KEYBD
Others	P91		PF		HEAD UP	PE		DRAWER OPEN			RS-232 CI1

KEYBD : 1=Normal Keyboard/0=Flat Keyboard
HEAD UP : 1=Up/0=Down
PE : 1=Paper End/0=Paper Not End
DRAWER OPEN : Reserved (1=Open/0=Close)
RS-232 CI1 :

5-4. DISPLAY

The machine has an LCD display, 5 x 7 dots, 2 lines, 16digits, at the front side and a 7-digit LED at the pop-up side

FRONT:



POP UP:

- Display DIGIT signal

  The above ST0 ~ ST6 are display digit signals.

  ST0: 1st digit ~ ST6: 7th digit

- Display SEGMENT signal

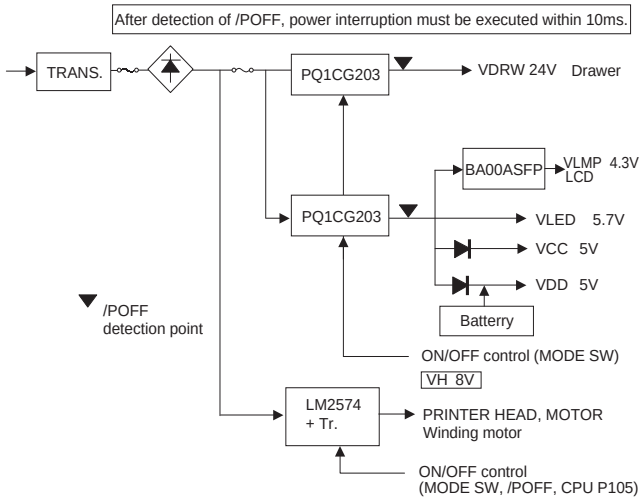
  The LED segment signal is outputted by writing SEGMENT data in the /CS3 space.

  Correspondence of DATA ~ SEGMENT

  D0 ~ D6 → a ~ g

  D7 → DP

6. POWER SUPPLY



7. REWRITING FLASH MEMORY

IPL from EP-ROM: After IPL SW is set to ON side the program is started from EP-ROM by turning on the power. The program on EP-ROM is transferred to flash ROM by switching the banks through S-RAM.

IPL from COM: Data from the PC is written to flash ROM through the COM port. (Max. 38.4 kbps)

8. DRAWER

The machine has a 1 channel of drawer port.

No open sensor is provided.

The driving time for the DRAWER solenoid are as follows:
50ms (max) 45ms (min)

No.	I/O	PORT	Function	Signal Name	Initial value
27	OUT	P73		Drawer Drive Signal	L

9. A/D CONVERSION

The machine has the following four signals at the A/D conversion ports.

<CPU's PORT>

No.	CPU PORT	Signal name	FUNCTION
97	AN0	TM	PRINTER HEAD temperature monitor
95	AN1	VPTEST	PRINTER HEAD voltage monitor
94	AN2	VREF	Refarence voltage
93	AN3	VBAT	VBAT (Battery voltage)

① Printer head temperature monitor

A voltage divided by the printer head temperature monitoring thermistor and the resistor is inputted to AN0 pin.

Printer head conduction must be controlled as shown below. For the printer head conduction time, refer to the M-T53II specifications.

HEAD tempreture	A/D conversion value (DEC)	Operation
-10°C or below	929~1023	MOTOR LOCK
-10°C ~ 0°C	869~928	Print in conduction time at 0°C
0°C ~ 70°C	232~868	Print in conduction time specified in the PR-45M specifications.
70°C or above	0~231	MOTOR LOCK

② Printer head voltage monitor

A voltage supplied by the printer head power through the printer and divided by the resistor is inputted to AN1 pin. The A/D conversion value is read after turning the VPON signal (CPU P105) to HIGH and stabilizing the voltage (20msec).

The print enable voltage range is 7.5V ~ 8.0V (A/D value: ??? ~ ???). The voltage is calculated from the AN1 value and the A/D conversion value of the AN2 reference voltage. For the calculation method, refer to the M-T53II specifications.

③ Reference voltage

The CPU power VDD is used as the reference voltage.

④ Battery remaining voltage

NO BATTERY 3.0V

LOW BATTERY 3.3V

10. BUZZER

PIEZO type BUZZER

The oscillating frequency is 4.0kHz ± 0.5kHz

11. RESET

The RESET signal is canceled when the power source of the device which used the 5V system (VCC, VDD, VLED) reaches the operating voltage.

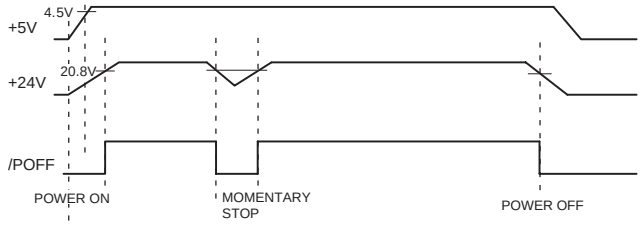
The RESET signal is generated under the following conditions.

1) When the mode key switch is set from SRV' to another position (except for OFF position).
2) When the power is turned on after 5sec or more from turning off the power and the VCC reaches 5V.
3) When the mode key switch is set from OFF position to another position (except for SRV' position) and VCC reaches 5V. (If the OFF time is within 5sec, the RESET signal may not be supplied.)

12. POFF

The POFF signal is changed from 0 to 1 when the 5V power and the 24V power reach the operating voltage level. When they fall below the operating voltage level, the POFF signal is changed from 1 to 0.

<POFF, RESET TIMING CHART>



In the model where a dry cell is used as the bakc-up battery, the CPU monitors the battery voltage when it operates. When the voltage falls below 2.8V, the RESET signal is supplied to prevent against malfunction of the CPU.

CHAPTER 5. DIAGNOSTIC PROGRAM

1. TEST ITEMS

The test items are as follows:

	Code	Description
1)	100	Display buzzer test
2)	101	Key code
3)	102	Printer test
4)	104	Keyboard test
5)	105	Mode switch test
6)	106	Printer sensor test
7)	107	Clock display test
8)	110	Drawer 1 open & sensor test
9)	120	External RAM test
10)	121	CPU internal RAM test
11)	130	FLASH ROM test
12)	160	AD conversion port test
13)	500	RS232C test

∗Starting DIAG.

Mode switch: PGM
Key operation: Above code + “PO” key

2. DESCRIPTION OF EACH DIAG PROGRAM

1) DISPLAY BUZZER TEST

① Key operation

100 → PO

② Test procedure

OP display

D	I	S	P		B	U	Z	Z	E	R		P	G	M	
0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F

Rear display 4.5.6.7.8.9.0.

The decimal point on the LED and the cursor on the LCD will shift from the lower digit to the upper digit in steps of 1 digit (every 200 msec)
After that, all segments will turn on (about 1 sec)
These two modes are repeated.
At the same time, the buzzer sounds continuously.

③ Check:

A) Each position is correctly displayed.

B) The brightness of each number is uniform.

C) The buzzer sound is normal.

④ End of testing

You can exit the test mode by pressing any key. The following is printed.

1 0 0

2) KEY CODE

① Key operation

101 → PO

② Test procedure

OP display

K	E	Y		C	O	D	E					P	G	M	
													◯	◯	◯

KEY CODE

③ Check:

KEY code : Every time a key is pressed, the hard code of that key is displayed as a decimal number.
When a key is pressed twice or pressed in an incorrect manner, --- will be displayed.

④ End of testing

You can exit the test mode by turning the mode switch to a position other than the PGM mode. The printer prints as follows:

1 0 1

3) PRINTER TEST

① Key operation

102 → PO

② Test procedure

OP display

P	R	I	N	T	E	R					P	G	M	

ZZZZZZZZZZZZZZZZZZZZZZZZ
ZZZZZZZZZZZZZZZZZZZZZZZZ
ZZZZZZZZZZZZZZZZZZZZZZZZ

3 lines of 24 digits are printed.

At the receipt setting, the logo is also printed and the receipt is issued.

③ Check:

The print is free from contamination, blur, and uneven density.

④ End of testing

The test will end automatically.

4) KEYBOARD TEST

① Key operation

____104 → PO

KEY check sum code

② Test procedure

The keyboard is checked using the sum check code of the key code. If the sum check code is not entered, the check is made using the sum check code of the default keyboard arrangement.
The sum check data for each model is entered to the front 4 digits of the DIAG code, and that data is compared with the key data added until the final key (CA/AT) is pressed.
Both data are the same, the test ends, printing the number given below.
If both data are different, the printer prints the error message.

OP display

K	E	Y		B	O	A	R	D				P	G	M	
1	0	4											○	○	○

KEY CODE

③ Check:

A) The content of completion print

④ End of testing

When the test ends normally: **1 0 4**

When an error occurs: E – – xxxx **1 0 4**
(xxxx is the value which added the key code.)

Note: Calculation of key sum check data
Hard codes (hexadecimal number) at the position (excluding feed key) where there is an input data contact are added.
However, the end key (CA/AT) is not added.
This data to which hard codes have been added is converted into a decimal number value, which will become the sum check data that will be entered when DIAG is started.

5) MODE SWITCH TEST

① Key operation

105 → PO

② Test procedure

OP display

M	O	D	E		S	W						P	G	M	
1	0	5													X

MODE: PGM_ □ _ ⏻ _OP X/Z_REG_MGR_X1/Z1_X2/Z2__
X : 1 2 OFF 3 4 5 6 7

The above X must be read in the correct order. (If the contact is open, 9 will be displayed.)

③ Check:

The display during testing and the content of the completion print.

④ End of testing

When the test ends normally **1 0 5**

When an error occurs: E – ~ – **1 0 5**

6) PRINTER SENSOR TEST

① Key operation

106 → PO

② Test procedure

Check the status of the paper end sensor and head up sensor.

OP display

H	/	P		S	E	N	S	O	R			P	G	M	
1	0	6											X	–	Y

③ Check the following.

X: 1 - Paper present
O - No paper

Y: 1 - Thermal head down
O - Thermal head up

④ End of testing

You can exit the test mode by pressing any key and the printer prints the following.

1 0 6

7) CLOCK TEST

① Key operation

107 → PO

② Test procedure

OP display

T	I	M	E	R		C	H	E	C	K		P	G	M	
								✱	✱	–	✱	✱		✱	✱

Hour Min. Sec.
Blinks at an interval of 0.5 sec.

③ Check:

"–" blinks and the clock counts up.

④ End of testing

When any key is pressed, the date and time are printed and the test mode will be terminated.

Y Y M M D D – h h m m s s 107
year month day hour min. sec.

8) DRAWER 1 OPEN & SENSOR TEST

① Key operation

110 → PO

② Test procedure

OP display

D	R	A	W	E	R		1				P	G	M		
															X

X : O = DRAWER OPENED
C = DRAWER CLOSED

③ Check:

A) The drawer 1 opens normally.

B) The sensor correctly indicates the status of the drawer 1.

∗On the XE-A212V, “C” (CLOSED) is always displayed, because the sensor is not equipped.

④ End of testing

You can exit the test mode by pressing any key. The printer prints the following.

1 1 0

9) EXTERNAL RAM TEST

① Key operation

120 → PO

② Test procedure

The standard 512 Kbyte RAM is checked.

The contents of memory must be stored before and after this test.

RAM (Bank0: 08000H~7FFFFH area, Bank2: 28000H~2FFFFH area) is tested in the following procedure:

a) Store data in the test areas

b) Write “00H”

c) Read and compare “00H” and then write”55H”

d) Read and compare “55H” and then write “AAH”

e) Read and compare “AAH”

f) Restore stored data

If an error occurs at a step, the error is printed.
If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

08000H, 08001H, 08002H, 08004H, 08008H,
08010H, 08020H, 08040H, 08080H,
08100H, 08200H, 08400H, 08800H,
09000H, 0A000H, 0C000H, 10000H,
18000H, 20000H,
28000H (Bank0), 28000H (Bank2),
30000H, 40000H

OP display

R	A	M									P	G	M		
1	2	0													

③ Check:

A) The completion print.

④ End of testing

The program ends after printing as follows:

When the test ends normally: **1 2 0**

When the test end abnormally: Ex – ~ – **1 2 0**
∗∗∗∗∗

x = 1: Data error, x = 2: Address error

When an error occurs, the printer outputs the error message and the address where the error has occurred in the area ∗∗∗∗∗.

10) CPU INTERNAL RAM TEST

① Key operation

121 → PO

② Test procedure

The test program tests internal RAM (10 Kbytes) of the CPU.

The contents of memory must be stored before and after this test.

RAM (00400H ~ 02BFFH area) is tested in the following procedure.

a) Store data in the test area.

b) Write “00H”

c) Read and compare “00H” and then write “55H”

d) Read and compare “55H” and then write “AAH”

e) Read and compare “AAH”

f) Restore stored data

If an error occurs at a step, the error is printed.
If any error does not occur, the following addresses are checked in turns.

Addresses to be checked:

01000H, 01001H, 01002H, 01004H, 01008H,
01010H, 01020H, 01040H, 01080H,
01100H, 01200H, 01400H, 01800H,
02000H

OP display

C	P	U		R	A	M						P	G	M	
1	2	1													

③ Check:

The completion print.

④ End of testing

The test program ends after printing.

When the test ends normally: **1 2 1**

When the test ends abnormally: Ex – ~ – **1 2 1**
∗∗∗∗∗

x = 1: Data error

x = 2: Address error

If an error occurs, the printer outputs the error message and the address where the error has occurred in the area ∗∗∗∗∗.

11) FLASH ROM TEST

① Key operation

130 → PO

② Test procedure

The test program checks that the checksum of the flash ROM (Bank0: F80000H ~ FFFFFH).

The lower two digits of the checksum should be 10H. (pending)

OP display

F	L	A	S	H		R	O	M				P	G	M	
1	3	0													

③ Check:

The completion print.

④ End of testing

The test will automatically be terminated and the printer prints as follows:

When the test ends normally: **1 3 0**

ROM ******** (Model name)

******** (Version)

When the test ends abnormally: E – – ~ – – **1 3 0**

ROM ******** (Model name)

******** (Version)

12) AD CONVERSION PORT TEST

① Key operation

160 → PO

② Test procedure

The test program displays the voltage of each AD conversion port.

Display

OP display

T	M				=	*	*	*	*		P	G	M		
1	6	0													

↓

OP display

V	R	F			=	*	*	*	*		P	G	M		
1	6	0													

↓

OP display

V	P	T	E	S	T	=	*	*	*	*		P	G	M		
1	6	0														

↓

End of testing

13) RS232C TEST

Install the RS232C loopback connector.

① Key operation

500 → PO

② Test procedure

The test program checks the control signals.

OUTPUT		INPUT			
/ER	/RS	/DR	/CI	/CD	/CS
OFF	OFF	OFF	OFF	OFF	OFF
OFF	ON	OFF	OFF	ON	ON
ON	OFF	ON	ON	OFF	OFF
ON	ON	ON	ON	ON	ON

Data communication check

A loopback test of 256-byte data is performed between SD and RD.

DATA: $00 - $FF BAUD RATE: 9600 BPS

OP display

R	S	2	3	2	C		T	E	S	T		P	G	M	
5	0	0													

③ Check:

The completion print.

④ End of testing

Completion print	RS TEST	OK 500
Error print	RS TEST	**NG**ERxx 500

xx Contents of error

01 ER DR error

02 ER CI error

03 RS CD error

04 RS CS error

05 SD RD error DATA error

06 SD RD error DATA error/framing error

3. KEY CODE TABLE

XE-A212V

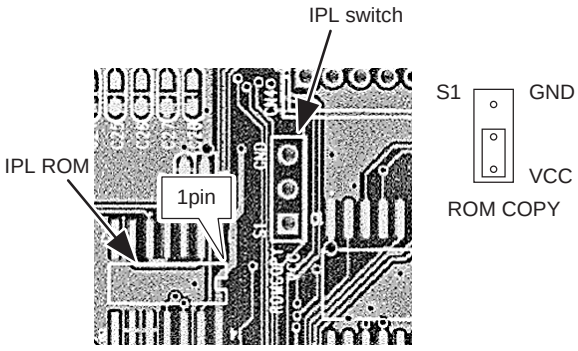
↑	098	032	048	055	039	033	049	065	035	067	099	133	120	121	138	155
128	112	096	103	113	097	115	051	084	100	102	101	117	089	105	106	107
064	119	135	130	129	131	116	132	118	134	085	104	136	073	122	090	123
080	087	082	066	081	083	068	086	150	070	069	072	088	153	154	074	139
144	071	146	050	145	147	148	054	038	053	149	152	056	057	058	075	091
016	151	034	017	001	019	052	036	022	021	037	040	025	041	042	059	027
000	007	023	018	002	003	020	004	006	005	024	008	009	010	026	043	011

CHECK SUM : 9029

CHAPTER 6. IPL FROM EP-ROM

Before working on the installation, unplug the AC cord from the AC outlet.

1. Open the top cabinet.
2. Set the IPL switch (S1) to VCC position.

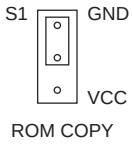


3. Install the IPL ROM to the IC socket of the MAIN PWB.
4. Turn the mode key switch to PGM position, and insert AC plug in AC outlet.
5. The IPL procedure is started.

   When the procedure is completed, the message of “Completed.” Is shown.

```
P-ROM  COPY
Completed.
```

6. Unplug the AC cord from the AC outlet.
7. Remove the IPL ROM to the IC socket of the MAIN PWB.
8. Set the IPL switch (S1) to GND position.



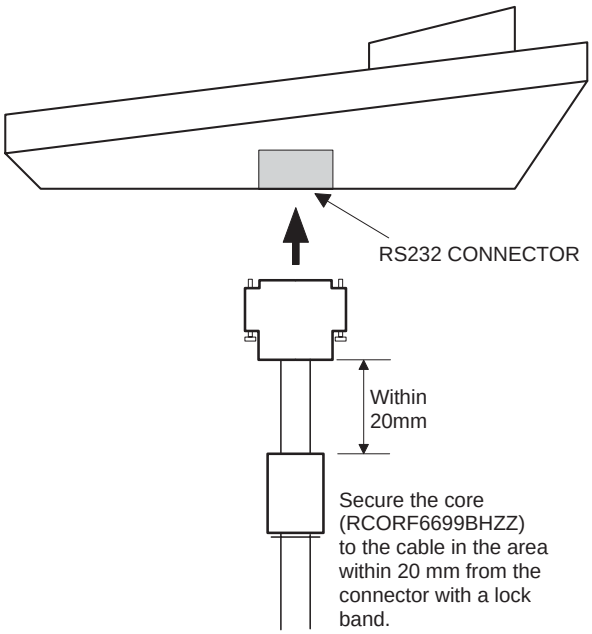
9. Replace the top cabinet.
10. Perform a master reset, insert AC cord in AC outlet.

```
*** MRS. ***
```

CHAPTER 7. CAUTION TO BE USED WHEN CONNECTING THE RS-232 CABLE

When connecting the RS-232 cable to the XE-A212, be sure to observe the following condiiton:

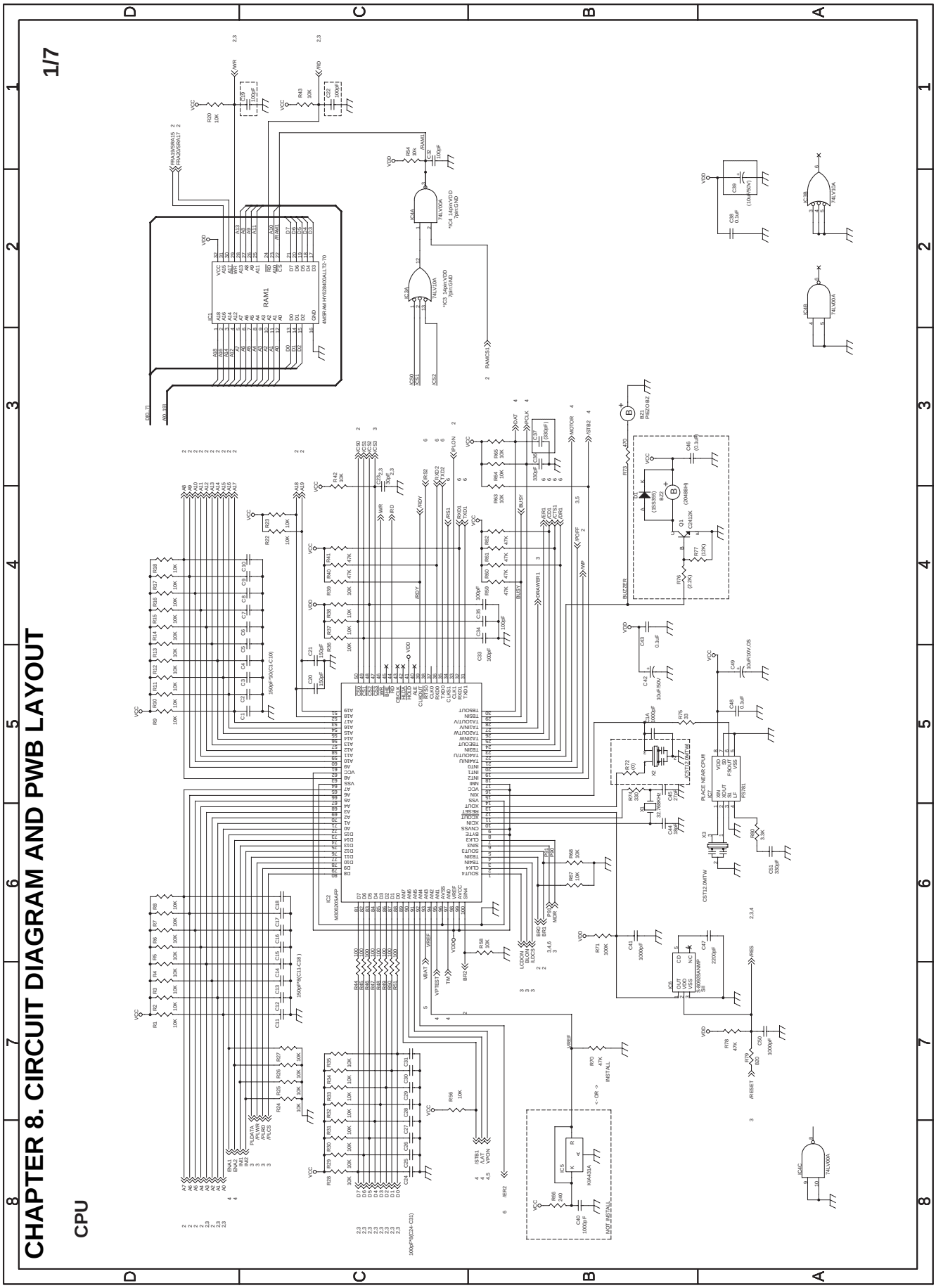
Secure the attached core (RCORF6699BHZZ) to the RS-232 cable in the area within 20mm from the connector.
[This is a necessary procedure to support the EMI (Electronics Magnetic Interface).]

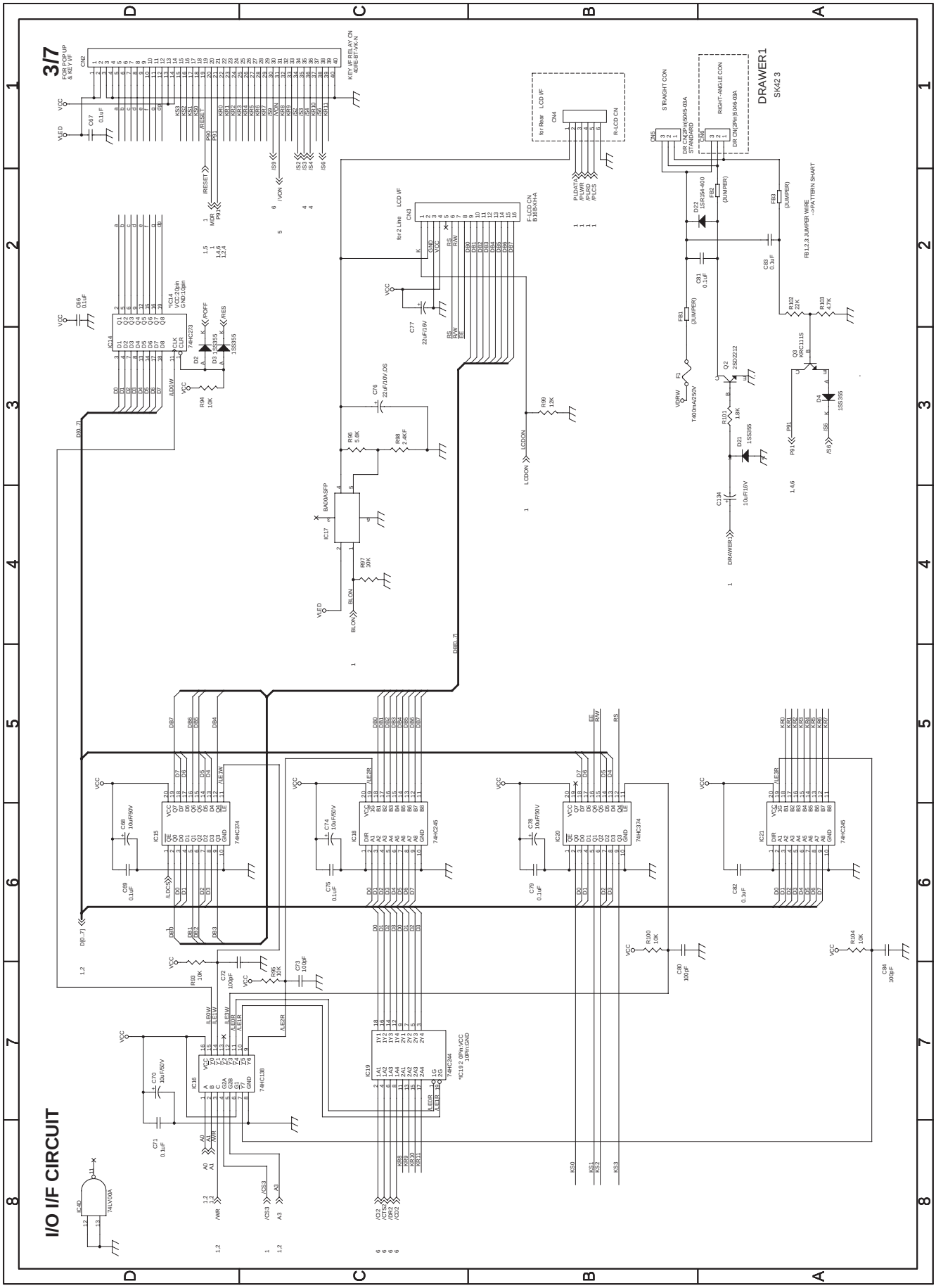


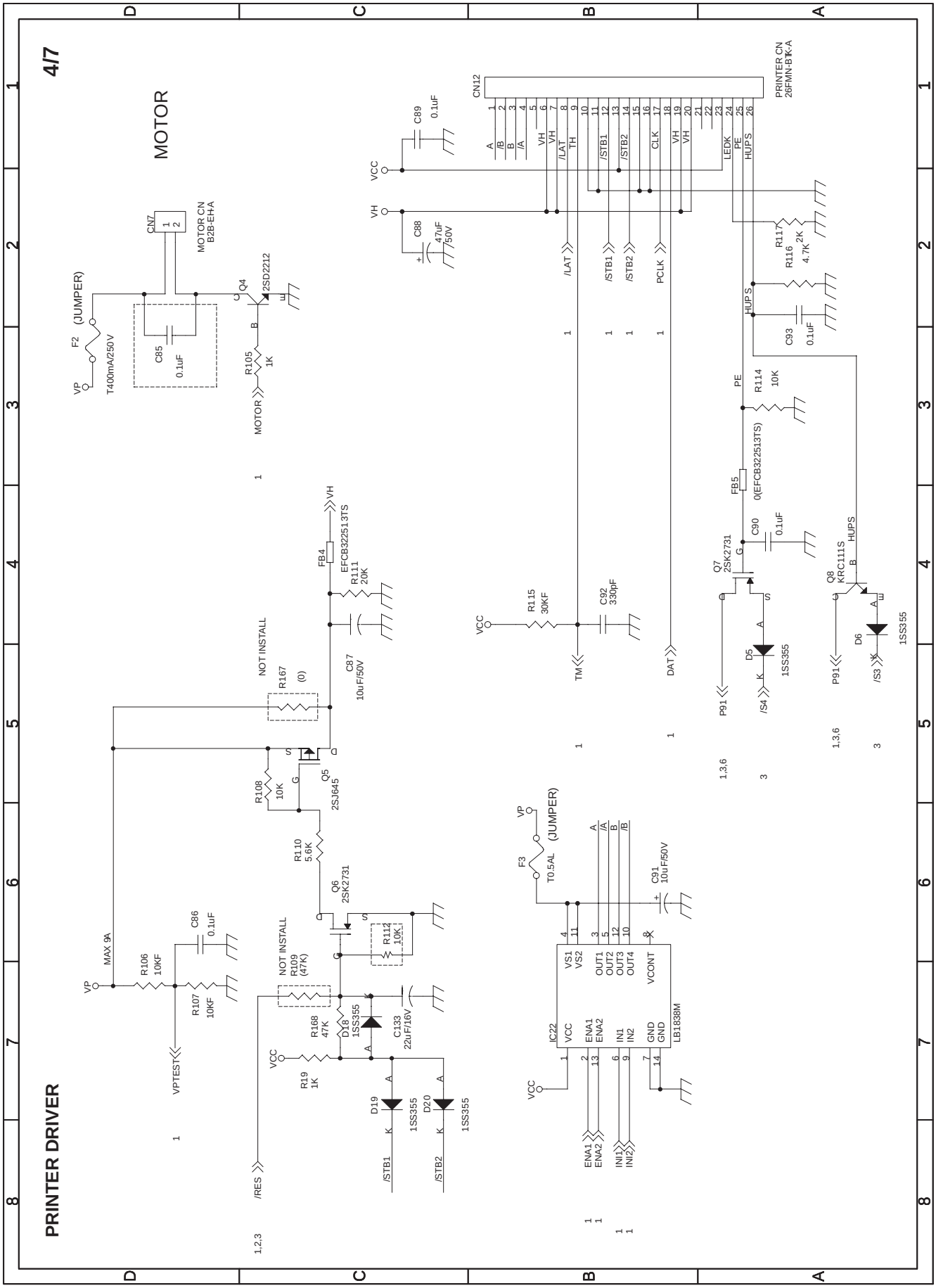
CHAPTER 8. CIRCUIT DIAGRAM AND PWB LAYOUT

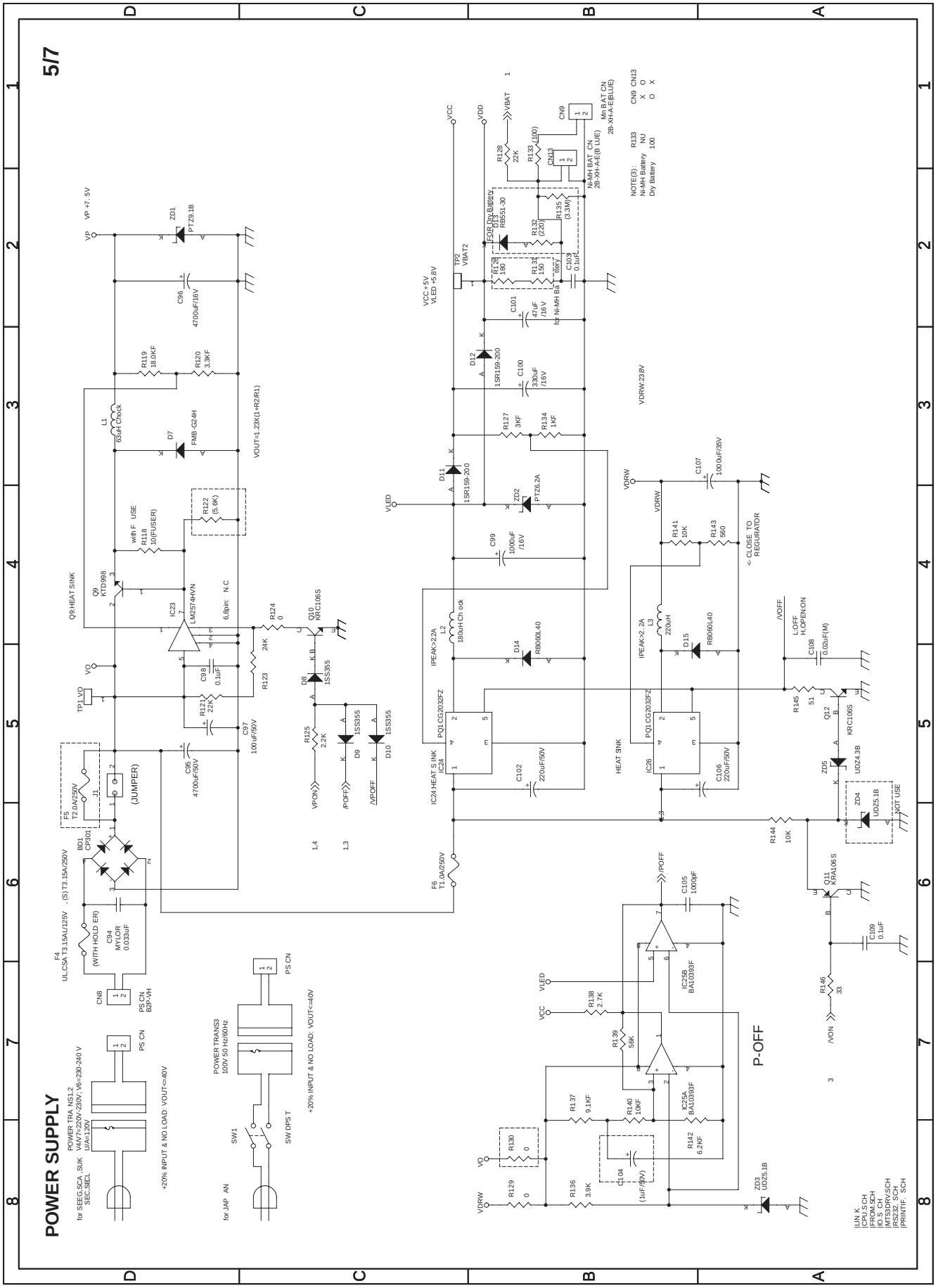
CPU

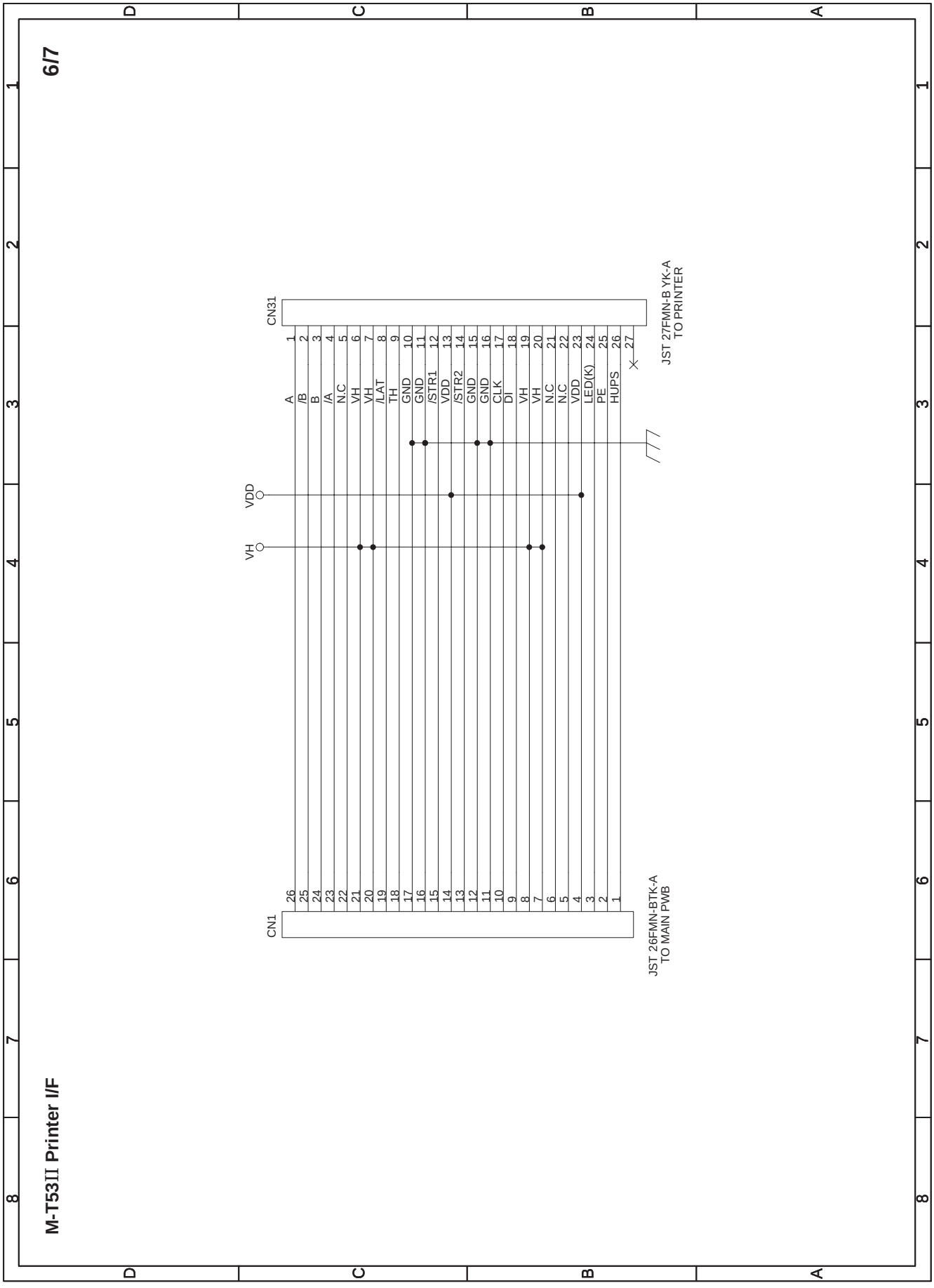
1/7

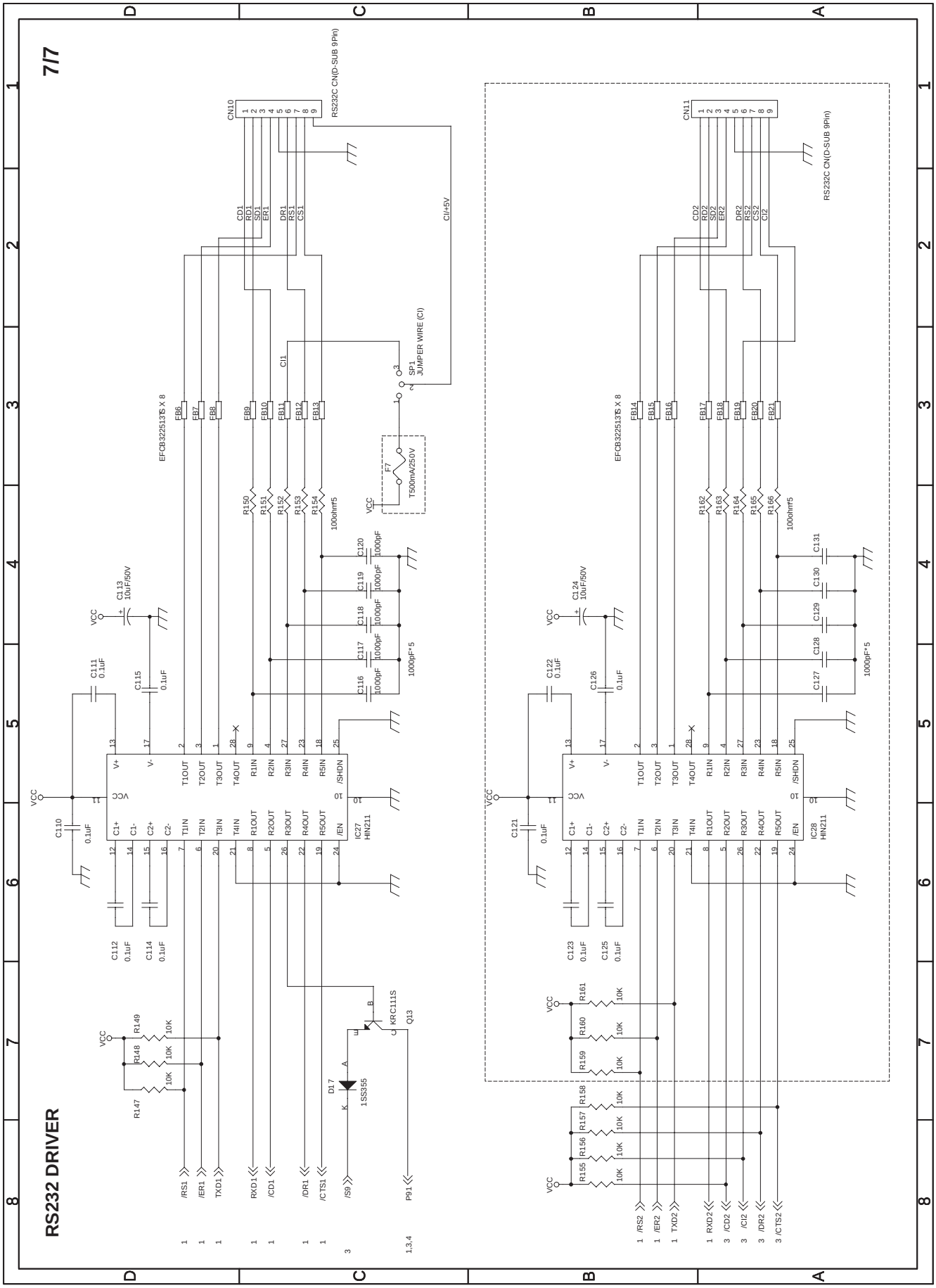



3/7
I/O I/F CIRCUIT
DRAWER1
SK42 3


4/7
PRINTER DRIVER
MOTOR
PRINTER CN
26FMN-BTK-A
CN12
MOTOR CN
B2B-EH-A
CN7
F2 (JUMPER)
T400mA/250V
F3 (JUMPER)
T0.5AL
IC22
LB1838M
VS1
VS2
OUT1
OUT2
OUT3
OUT4
VCONT
VCC
ENA1
ENA2
IN1
IN2
GND
Q4 2SD2212
Q5 2SJ645
Q6 2SK2731
Q7 2SK2731
Q8 KRC111S
FB4 EFCB322513TS
FB5 0(EFCB322513TS)
R167 (0)
NOT INSTALL
R108 10K
R110 5.6K
R111 20K
R112 10K
R114 10K
R115 30KF
R116 4.7K
R117 2K
R105 1K
R106 10KF
R107 10KF
R109 (47K)
R168 47K
R19 1K
C85 0.1uF
C86 0.1uF
C87 10uF/50V
C88 47uF/50V
C89 0.1uF
C90 0.1uF
C91 10uF/50V
C92 330pF
C93 0.1uF
C133 22uF/16V
D5 1SS355
D6 1SS355
D18 1SS355
D19 1SS355
D20 1SS355
VP
VH
MAX 9A
VPTEST
/RES
/STB1
/STB2
/LAT
TM
PCLK
DAT
P91
/S3
/S4
PE
HUPS
LEDK
CLK
TH
A
/A
B
/B


5/7
POWER SUPPLY
P-OFF
HEAT SINK
(JUMPER)
NOT USE
+20% INPUT & NO LOAD: VOUT<=40V
VOUT=1.23X(1+R2/R1)
VDRW:23.8V
VCC+5V
VLED +5.8V
VP +7. 5V
CLOSE TO REGULATOR
LIN.K
CPU.SCH
FROM.SCH
IO.S CH
MTS3DRV.SCH
RS232_SCH
PRINTF_SCH

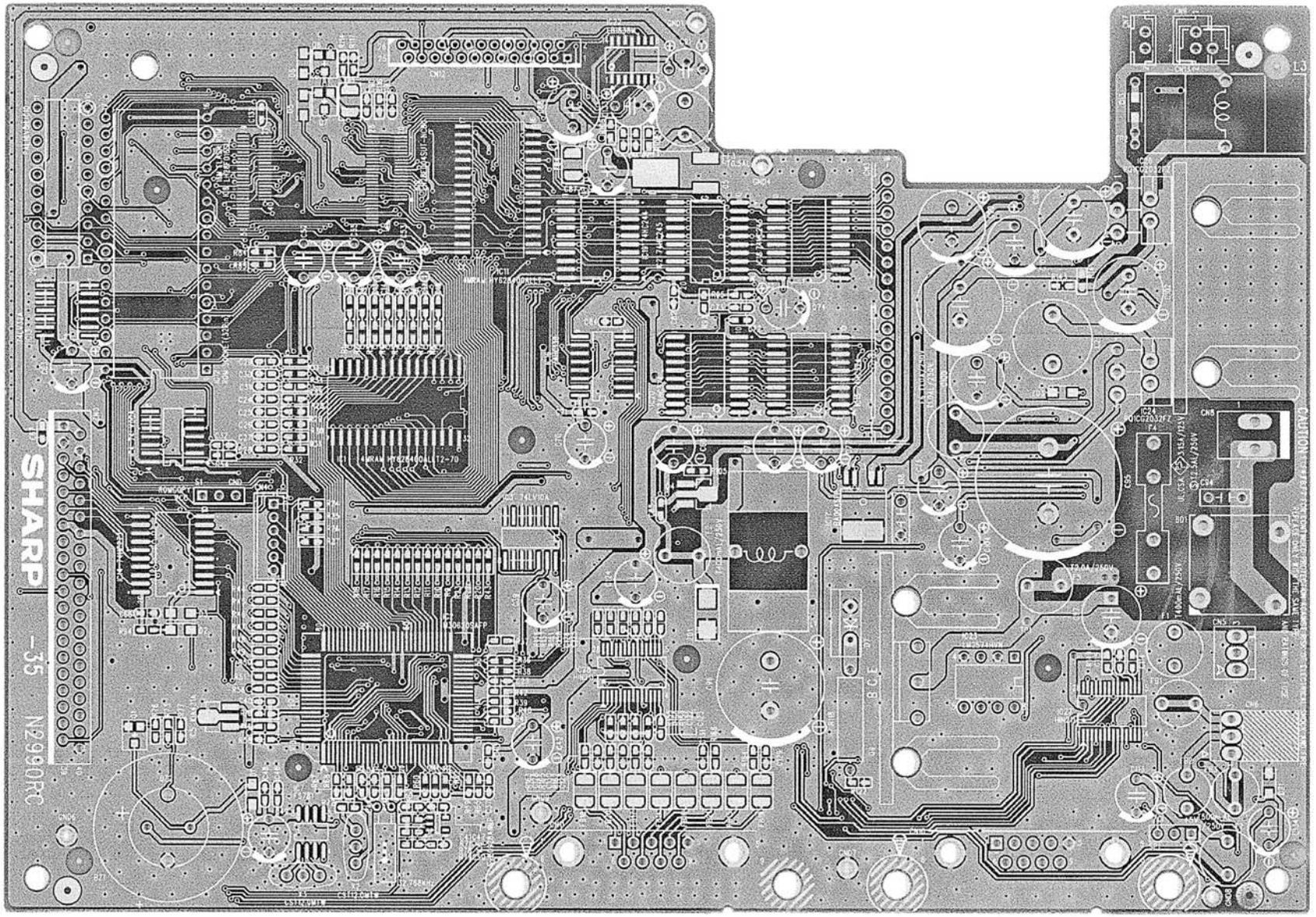

6/7
M-T53II Printer I/F
CN31
CN1
JST 27FMN-B YK-A
TO PRINTER
JST 26FMN-BTK-A
TO MAIN PWB
VDD
VH
A
/B
B
/A
N.C
VH
VH
/LAT
TH
GND
GND
/STR1
VDD
/STR2
GND
GND
CLK
DI
VH
VH
N.C
N.C
VDD
LED(K)
PE
HUPS

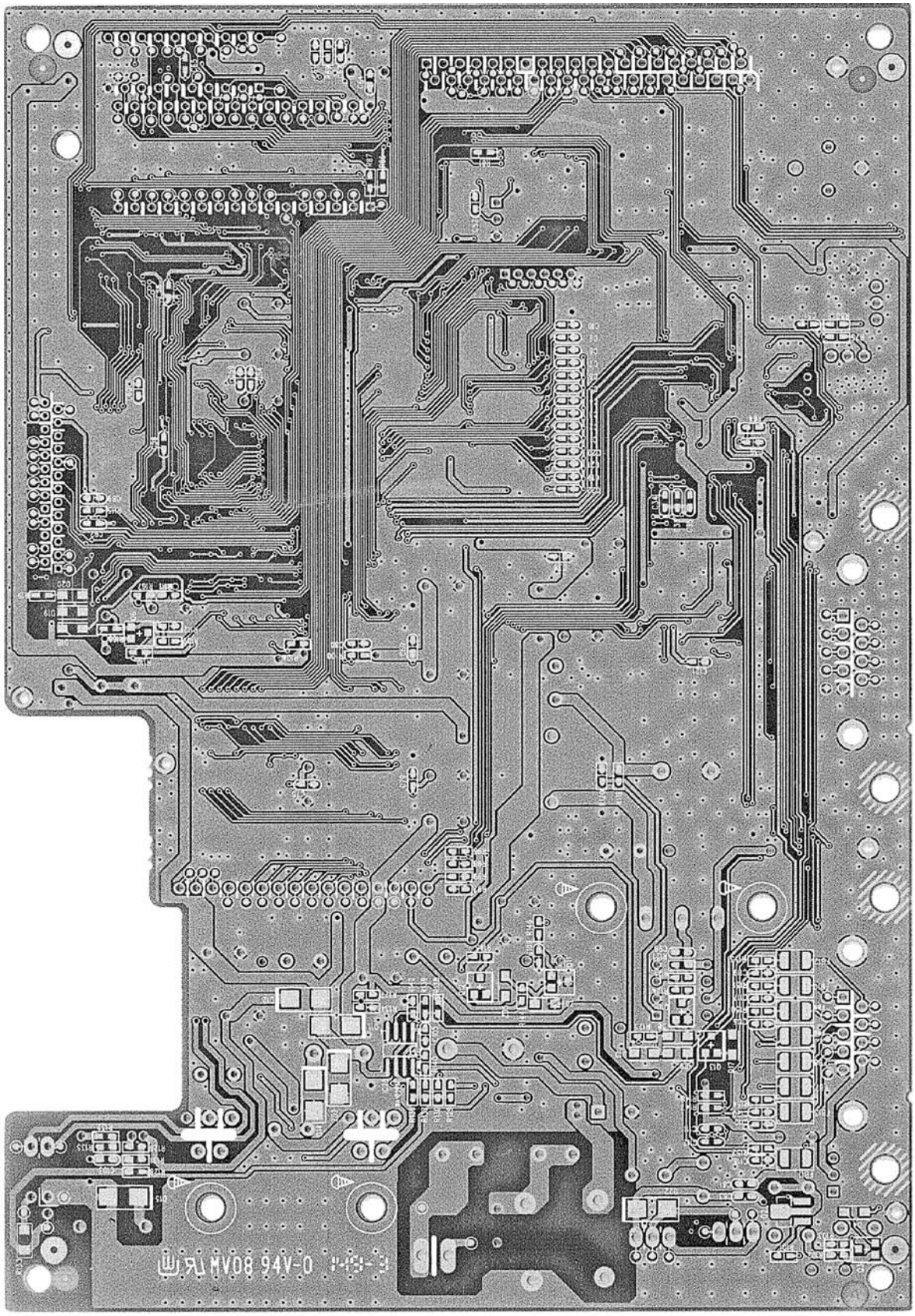

7/7
RS232 DRIVER
RS232C CN(D-SUB 9Pin)
CN10
CN11
EFCB322513TS X 8
IC27 HIN211
IC28 HIN211
KRC111S
1SS355
JUMPER WIRE (CI)
T500mA/250V
100ohm*5
1000pF*5
VCC
/RS1
/ER1
TXD1
RXD1
/CD1
/DR1
/CTS1
/S9
P91
/RS2
/ER2
TXD2
RXD2
/CD2
/CI2
/DR2
/CTS2

PWB LAYOUT

MAIN PWB LAYOUT

A side





B side

MEMO

SHARP

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